

SCIENCE AND TECHNOLOGY
COMMITTEE

First Report

THE POLICY AND ORGANISATION
OF THE OFFICE OF
SCIENCE AND TECHNOLOGY

Volume 1: Report

*Ordered by The House of Commons to be printed
10 December 1992*

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The Science and Technology Committee is appointed under SO No. 130 to examine the expenditure, administration and policy of the Office of Science and Technology, associated public bodies and similar matters within the responsibilities of the Secretary of State for Northern Ireland.

The Committee consists of a maximum of eleven members, of whom the quorum is three. Unless the House otherwise orders, all Members nominated to the Committee continue to be members of it for the remainder of the Parliament.

The Committee has power:

- (a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;
- (b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;
- (c) to communicate to any other such committee and to the Committee of Public Accounts its evidence and any other documents relating to matters of common interest; and
- (d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

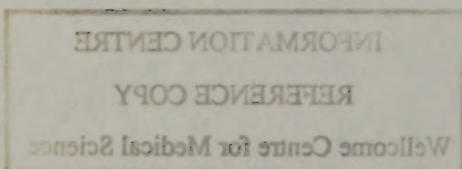
The following were nominated members of the Committee on 13 July 1992:

Mr Spencer Batiste	Sir Giles Shaw
Dr Jeremy Bray	Sir Trevor Skeet
Mr Malcolm Bruce	Dr Gavin Strang
Mrs Anne Campbell	Sir Gerard Vaughan
Cheryl Gillan	Mr Alan W Williams
Mr William Powell	

Sir Giles Shaw was elected Chairman on 15 July 1992.

On 9 November 1992 Mr Malcolm Bruce was discharged and Mr Andrew Miller added to the Committee.

On 16 November 1992 Dr Gavin Strang was discharged and Lynne Jones added to the Committee.



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FIRST REPORT

THE POLICY AND ORGANISATION OF THE OFFICE OF SCIENCE AND TECHNOLOGY

The Science and Technology Committee has agreed to the following Report:

I INTRODUCTION

1. In the past Committees of both Houses have criticised the lack of a coherent government policy on the crucial subject of science and technology.¹ Developments since the general election lead us to hope that this situation will change. The Office of Science and Technology was established on 14th April 1992, to bring together responsibility for science and technology issues. On July 9th the Chancellor of the Duchy of Lancaster announced that early in 1993 he intended to issue a White Paper on the future of science and technology in the United Kingdom and the role of government in encouraging and directing scientific endeavour. The House of Commons appointed a Select Committee to monitor the new department on 13th July and at our first meeting on 15th July we decided to inquire into the policy and organisation of the Office of Science and Technology (OST). The Chancellor of the Duchy had invited comments on a wide-ranging series of questions designed to set a framework for consultation on the White Paper. Since we wished to report in time for our comments to be taken into account in the drawing up of the White Paper, we decided at the outset to focus our inquiry on the organisational structure of the new department.

2. In the course of this inquiry we have received written evidence from a variety of individuals and institutions. Where possible, we have published with this Report both submissions made directly to ourselves and those submissions to the Chancellor of the Duchy sent directly to us which have not been made widely available elsewhere. We have also taken oral evidence from the Chancellor of the Duchy of Lancaster, in his capacity of Minister for Science, and the Parliamentary Secretary, Mr Robert Jackson, the President of the Board of Trade, the Chief Scientific Adviser (CSA), the heads of the Research Councils and the Chief Executive of the Higher Education Funding Council for England (HEFCE) (formerly the Chief Executive of the Universities Funding Council), representatives of industry, and the Chairmen of the Advisory Council on Science and Technology (ACOST) and the Advisory Board for the Research Councils (ABRC).² We have been able to draw upon many published papers brought to our attention by witnesses, such as the Royal Society Report on the Future of the Science Base. We are grateful to all those who gave evidence, both oral and written, and for the help our specialist advisers, Mr Gerard Fairtlough CBE, and Sir Peter Swinnerton-Dyer, gave us in the course of the inquiry.

3. The Chancellor of the Duchy of Lancaster told us that the Government had "taken the opportunity of the setting up of this new department to work towards a reformulation of Government science and technology policy".³ Although lack of time has forced us to concentrate upon the organisational structure of the new department, we received much evidence which addressed the wider questions the Chancellor raised about the relationship between science and industry. This evidence made it clear to us that any reformulation of government science and technology policy will have to address technological competitiveness and its relationship to our scientific effort. This is an issue to which we will return in the future; but there are certain key concerns which we wish to explore. Accordingly, after we examine the role of the OST itself, and those other science base issues which the OST will need to resolve, our Report will explore some general concerns about technological competitiveness which the OST and DTI will need to address together.

II THE ROLE OF THE OFFICE OF SCIENCE AND TECHNOLOGY

4. To quote the President of the Board of Trade, "first we have to decide what we want to do and then to decide whether the existing machinery can do it".⁴

5. OST's policy aims have already been determined and are clearly set out in R&D'92 as being to:

- provide advice to Government on all aspects of science and technology (S&T);
- promote the effective use of S&T resources;

¹Education, Science and Arts Committee, First Report Session 1990-91, *Science Policy and The European Dimension*, HC 127, paras 39-47 and Select Committee on Science and Technology, Third Report Session 1992-93, *Proposed Science and Technology White Paper*, HL34, para 4.

²A list of abbreviations is appended to this report.

³Q1

⁴Q104

- develop and coordinate overall Government policy on S&T nationally and internationally;
- help achieve the maximum contribution to our quality of life and national economic performance from Government expenditure on S&T;
- help the Government take decisions on S&T priorities, both in the Public Expenditure Survey and through the Ministerial Committee on S&T which the Prime Minister chairs;
- enable S&T issues which concern more than one Department to be satisfactorily resolved through collective discussion;
- sustain and enhance the UK S&T base and to develop its capacity to advance scientific knowledge;
- encourage technology transfer from the UK science base to industry and commerce in order to improve our economic performance;
- encourage the training of the necessary skilled scientists and technologists needed for the UK science base and the wider economy".¹

6. The establishment of the OST shows that the machinery which existed before the last General Election was not thought to be delivering these objectives. The question is what status and structure the OST needs in order to deliver them more effectively.

7. Although the policies which the OST is to forward are sound in themselves, the language in which they are couched is disturbing. The OST will "promote", "co-ordinate", "help", "encourage" and "enable"; admirable though these words are, there is nothing in the list above to suggest that OST will necessarily have the powers needed to achieve its goals. **We consider that, in time, OST should have the power to shape science policy.**

8. OST may well find its role of encouraging consistent government policy on science is hindered by the fact that it has a relatively small proportion of the total of government funded research and development in its remit. The OST is now responsible for "the science budget"; ie that money which, largely, is allocated to Research Councils.² As far as research in the higher education sector is concerned a "dual funding" system still operates; not only are some specific projects funded by the Research Councils, but the Higher Education Funding Councils (HEFCs) also provide institutions with funding for the costs of providing a research infrastructure and carrying out some undirected research. The Higher Education Funding Council for England (HEFCE) is funded by the Department for Education (DfE); those for Scotland and Wales by the territorial departments.³

9. The vast bulk of government R&D expenditure, however, is accounted for by individual government departments which are responsible for funding the research they deem necessary to meet their policy needs. In 1990 the amount spent by the MoD on R&D was more than the entire science base, that is, the combined expenditure of both streams of the dual support system.⁴ Moreover, since some government departments commission significant amounts of their research from the Research Councils, their decisions can affect areas under the OST's control.

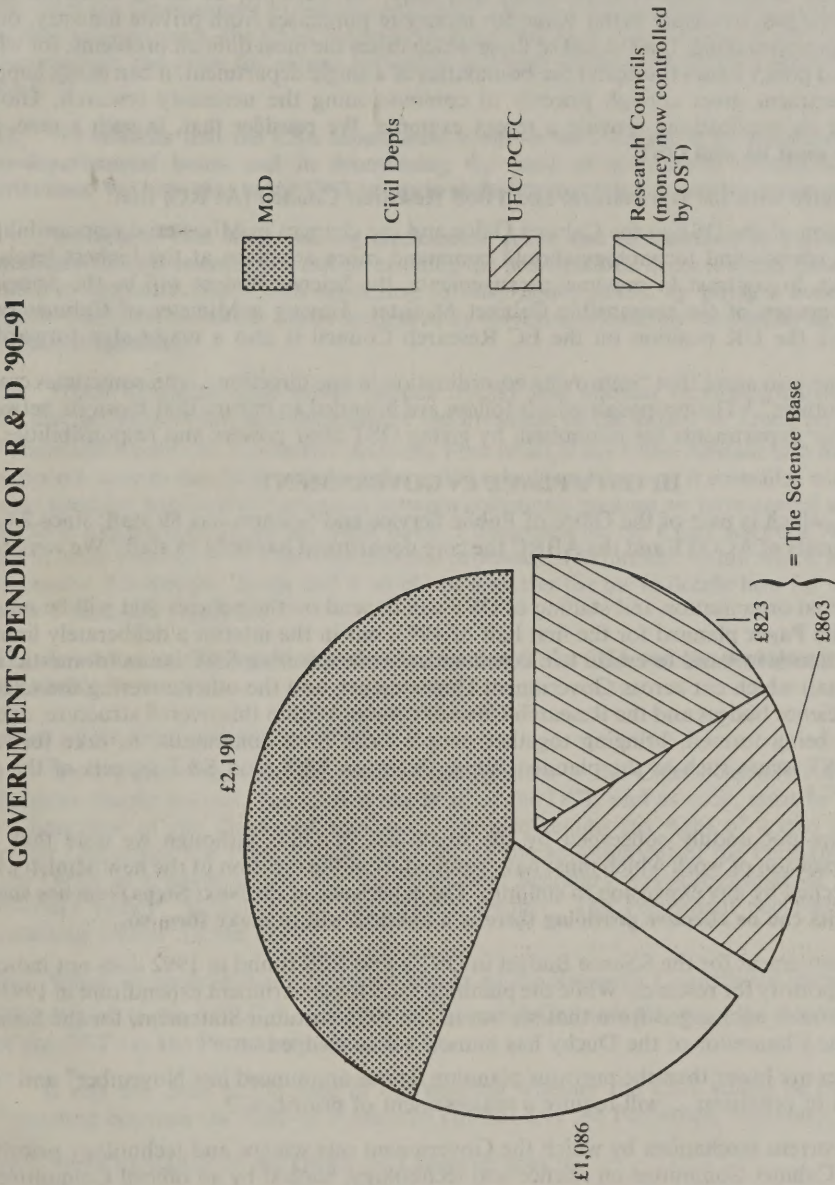
¹R&D'92, Annual Review of Government Funded Research and Development 1992, 1.13

²See R&D'92, p.8, para 2.1.4

³The Northern Ireland Office directly funds the two Northern Ireland universities, but it receives advice from the NI Higher Education Funding Council, which will have a formal relationship with the HEFCE.

⁴The Research Councils, and the precursors of the HEFCs, the Universities Funding Council and the Polytechnics and Colleges Funding Council.

CHART 1



Figures taken from R & D '92.
All figures rounded

10. Clearly, the OST will need to work with other departments to perform its function of developing and co-ordinating "Government policy on S&T" and helping "the Government take decisions on S&T priorities".¹

11. Witnesses warned us against removing the power to decide what research and development activities they should fund from individual departments.² But there is a wide variety of reasons why departments fund research; they may, for example, do so to underpin their regulatory activities, to ensure better value for money in purchases from private industry, or to inform their policy-making. It is the last of these which raises the most difficult problems, for when science-related policy issues transcend the boundaries of a single department, it can easily happen that no department gives enough priority to commissioning the necessary research. Global warming and its implications provide a recent example. **We consider that, in such a case, the responsibility must lie with OST.**

12. We agree with the Agricultural and Food Research Council (AFRC) that:

"The creation of the OST in the Cabinet Office and the changes in Ministerial responsibilities mean that science and technology should command more attention at the highest levels in government. In contrast to previous arrangements, the Science Budget will be the principal spending concern of the responsible Cabinet Minister...Having a Minister of Cabinet rank representing the UK position on the EC Research Council is also a major step forward".³

However, we also agree that "improving co-ordination in one direction ... can sometimes create tensions...in others".⁴ The proposals which follow are intended to ensure that tensions between OST and other departments are minimised, by giving OST clear powers and responsibilities.

III OST's PLACE IN GOVERNMENT

13. OST, which is part of the Office of Public Service and Science, has 89 staff; since 23 are in the secretariats of ACOST and the ABRC the core department has only 66 staff.⁵ We were told that:

"The eventual organisation and staffing of OST will depend on the policies that will be set out in the White Paper planned for the first half of 1993, but in the interim a deliberately limited reorganisation is in hand to create two commands — one covering S&T issues (domestic and international) which cut across Government Departments, and the other covering the science base, the science budget and the Research Council system. Within this overall structure, action teams are being formed, bringing together people from both commands, to take forward priority OST issues such as the planned White Paper on S&T, and S&T aspects of the EC Presidency".⁶

14. We are not unduly concerned by the small size of OST, although we note that the inevitable expansion of work which must have resulted from the creation of the new Ministry has not been matched by any expansion in staffing.⁷ **The experience of the Next Steps team has shown that small units can be effective providing there is a political will to make them so.**

15. The settlement for the Science Budget in OST's first PES round in 1992 does not indicate an increased priority for research. While the planning total for government expenditure in 1993-94 at £244.5 billion is unchanged from that set out in the 1991 Autumn Statement, for the Science Budget, as the Chancellor of the Duchy has himself acknowledged

"The figures are lower than the previous planning figures announced last November" and "the lower level of provision ... will require a reassessment of priorities".⁸

16. The current mechanism by which the Government sets science and technology priorities is through a Cabinet Committee on science and technology, backed by an official Committee of departmental Chief Scientific Advisers, chaired by the Chief Scientific Adviser (CSA).⁹ This structure has already allowed the government to take strategic decisions such as that to shift the balance between military and civil research spending.

¹R&D.92 1.1

²See Q511

³Evidence, p 46, para 7.

⁴ibid

⁵Evidence p.1

⁶Evidence p.1 para 3, for details of organisation see Evidence pp.3-4.

⁷Q397

⁸Official Report 12.11.92 c.947w

⁹Q2

17. In the last two years the CSA has also been given an increasing role in the PES round. "In 1991, the Prime Minister invited the Chief Scientific Adviser (CSA) to advise Treasury on the Science and Technology components of the bids submitted by Departments as part of the Public Expenditure Survey. Having studied the S&T bids, and after discussion with individual Departments of the argument supporting their bids, the CSA provided advice to the Chief Secretary and the Prime Minister on the balance of expenditure between different areas, and on the total for Government expenditure on S&T...In the rather different context of the present survey arrangements, the Chief Scientific Adviser has once again provided advice to the Chief Secretary on the value for money and scientific merit of the proposals for future spending on S&T."¹

18. We consider that the CSA should have a role in the PES round at departmental level, on inter-departmental issues and in determining the total of government funded R&D and its distribution. We hope that as the OST grows in authority that this role will become more significant.

19. We believe that other existing mechanisms could also be enhanced to provide a stronger central direction for science, without threatening the principle that departmental customers should be able to commission research according to their policy needs, by giving a committee of the departmental Chief Scientific Advisers, chaired by the CSA, a lead role in considering priorities for government spending.

20. When we asked what would happen if OST and another department disagreed about particular projects within that department the President of the Board of Trade replied:

"There will have to be a collective decision. First of all, if my Chief Advisor tells me this should happen I have to decide to take his advice. If I take his advice and it coincides with OST there is no need for any further discussion between colleagues because we have agreed whatever that decision amounts to. If, on the other hand, I disagree with my Chief Scientific Advisor and I am at odds with the OST I have the normal processes of Whitehall within which to decide how to resolve this dispute. In the end it would be a matter for me to decide how far up the sort of scale I push the argument".²

21. In such a case we would urge that the opinion of the CSA and the departmental CSAs as a group should be sought.

Position of the Chief Scientific Adviser

22. We are concerned that the position and powers of the Chief Scientific Adviser are not sufficiently clearly defined. The CSA is the head of the OST, and as such, must be an official of the Chancellor of the Duchy of Lancaster. He also retains his right of access to the Prime Minister.³ However, the Press Release announcing the appointment of the Permanent Secretary of the OPSS as a whole stated that the Permanent Secretary was responsible for "science and technology policy" as well as for the Science Budget.⁴ The Permanent Secretary is also the Accounting Officer for the OST.⁵

23. When we took evidence from the Heads of the Research Councils we learnt that "In addition to the ABRC the heads of the Research Councils also meet the Accounting Officer of the OST i.e. the Permanent Secretary".⁶

It was not clear at the time of our meeting whether the CSA would be present at any meeting between the head of a research council and the Permanent Secretary.

24. The Chancellor of the Duchy of Lancaster told us

"I would not want to say the Chief Scientific Adviser is subordinated [to the Permanent Secretary]...he has his own Government-wide responsibility and is accountable to the Prime Minister directly".⁷

Sir Robin Nicholson, the Chairman of ACOST, agreed:

¹Evidence p.2

²Q 106

³QQ 16-18

⁴Office of Public Service and Science News Release, September 1992.

⁵Q 8

⁶Q 213

⁷Q 6

“As far as the CSA within the OST is concerned I think it would be a mistake if the CSA became too involved in the management of the funding which is going through OST. I do not see how he can - and Rothschild said this - at one time be the chief scientist in a department responsible for the funding, accountable for the funding, and at the same time be an adviser when he is looking much more broadly”.¹

25. We see the force of this argument. Nevertheless, we would wish to see the position of the CSA and OST considerably strengthened. We do not believe that this will be possible if the OST itself is so structured that there is a possibility that the line of responsibility from Head of Research Council to Accounting Officer can bypass the Chief Scientific Adviser. The Secretary of the Medical Research Council, Dr Rees, told us

“I see no difficulty in principle with being accountable to Richard Mottram² for proper conduct and proper use of public money but I think it is important to have another line of accountability about delivery of research results and trained people, work and so on within the context of the Government strategy. That, I think, should quite firmly come under the direction of the OST and the Chief Scientific Adviser”.³

26. We agree with Dr Rees. It may be felt inappropriate to burden the CSA with the formal responsibilities of an accounting officer. However some means should be found to ensure that the Permanent Secretary of OPSS cannot intervene in matters concerning science policy without the CSA's consent. The Accounting Officer's role of the Permanent Secretary should not extend to the determination and distribution of the science budget, but should merely cover the propriety of expenditure.

27. We were also concerned that some departmental Chief Scientific Advisers and Heads of Research Councils were of higher grade than the CSA himself.⁴ The CSA told us:

“I consider it a privilege and a pleasure to be Chief Scientific Adviser. I am delighted to be in that post, getting paid a salary which is twice what I would get as a university professor. I have no concerns.”⁵

28. Nonetheless, it is the authority and not the pay which matters. Given the key role the CSA will play in the new structure **we recommend that the CSA's role as Government Chief Scientific Adviser be made clear⁶ in the title of the post and its grade.** The post should be upgraded to ensure that the CSA is not graded below any Scientific Adviser colleagues. At present the CSA is a Grade 2 post, while the CSA (MOD) and the chairman of the Science and Engineering Research Council are Grade 1A. **We recommend that the CSA be Grade 1A.**

An Additional Budget for OST

29. In its submission to the Chancellor of the Duchy of Lancaster, the Advisory Council on Science and Technology (ACOST) recommended that OST should encourage “collaborative Departmental and industrial R&D programmes in key generic technologies through a substantial OST budget for mission oriented research” which would enable it to provide “pump-priming money”.⁷ The Royal Society has also proposed that OST should “have charge of a separately identifiable budget” to meet, *inter alia* “activities transcending the responsibilities of individual Departments that nonetheless are...vital components of the national R&D infrastructure”.⁸ Such a budget could also, as we discuss below,⁹ allow the OST to commission particular studies; the Royal Society suggested that the budget could be a small proportion of the total of government expenditure on research and development. We are impressed by these ideas. **OST's position should be strengthened by providing it with a budget for research over and above the monies allocated for the science budget.**

¹Q 510

²The present Permanent Secretary.

³Q219

⁴Q21-25

⁵Q 22

⁶Q 462-464

⁷Acost: White Paper on Science and Technology an ACOST contribution, Key Conclusions and Recommendations and pp.13-14.

⁸Evidence p.222

⁹See para 76.

Provision of Trained Personnel

30. Many of our witnesses were concerned about the quality of science education in the UK. This is not, of course, a matter for the OST alone. At postgraduate level this responsibility is divided. The costs of postgraduate teaching are shared between block grants which come through the HEFCs, and student fees, which are often paid by the Research Councils, as are maintenance grants for a significant proportion of postgraduate students.¹ We are told that “the DfE has regular day to day contact with the Office of Science and Technology over a wide range of issues. The respective interests of the DfE and OST in research in universities mean that policies and practices need to develop in harmony”.² We consider that OST’s interest in education policy should extend more widely than this implies.

31. There was a strikingly strong agreement among our witnesses that a key output of the science base was a supply of trained personnel for industry. There was much concern that the supply of able scientific graduates was declining, and that many science graduates chose to pursue more remunerative careers in other professions. Glaxo wrote

“There is no shortage of well qualified people available to the larger companies but this is due mainly to the levels of salary that are now being offered. This however has a detrimental effect upon the numbers and quality of scientifically qualified personnel available for recruitment by the smaller companies, HEIs and RIs. Overall, the number of scientific and technical candidates available for employment is declining and companies are having to work harder in the recruitment process”.³

This is comment from an industry making best use of science and technology and competing most effectively in world markets. Other industries do not create the demand for scientists and technologists, and the supply would be unable to meet the demand if they did.

32. The supply of postgraduates in science and technology, on which industry depends, itself depends on higher education being able to recruit enough able students motivated to study these subjects. Also the supply of research scientists is only a small part of the total need for scientific education in modern society, where science needs to be part of the general educational background. We acknowledge that the DfE has attempted to stimulate science teaching in schools, through the provision of bursaries for science teachers and through the introduction of the National Curriculum. Witnesses were concerned that

“the poor facilities for science in schools, the lack of good financial rewards and status, for science teachers”,⁴

and the move to single science in the national curriculum, were affecting the supply of undergraduates who wished to study science. Glaxo warned:

“There is a danger that the recent introduction of combined sciences at GCSE level could detract from this by offering an easy option which could result in students going forward to “A” level studies in individual sciences without the essential foundations. This will lead inevitably to declining standards at this level which in turn will have consequences for university teaching. Whilst it must be right to encourage more pupils to gain some knowledge of science this should not be done at the expense of those who will be the career scientists of the future”.⁵

The HEFCE has said that “many institutions report a shortage of good quality applicants to read for first degrees in science and technology subjects, despite efforts by universities to recruit them”⁶ and in oral evidence a witness from the Engineering Employers’ Federation (EEF) told us:

“In engineering we are now willing to take on very low calibre people for what needs to be high calibre work”.⁷

33. Clearly the DfE needs to retain lead responsibility for science education up to graduate level. Nonetheless, given the effect that the DfE’s policies will have on the availability of postgraduates and skilled personnel for industry, **we recommend that OST should help to formulate policy on science education at all levels.**

¹There are a variety of other sources of support, although many postgraduate students meet their own costs.

²Evidence p.230

³Evidence p.206, para 2.22

⁴ Evidence p.87, para 4.

⁵Evidence p. 207, para 2.28

⁶OST White Paper on Science and Technology: Submission by the Higher Education Funding Council for England, paragraph 20.

⁷Q285

34. It is clear that a significant contribution to the decline in the supply of candidates for a science or technology based career is the fact scientific research and development in both public and private sectors appears to offer poor remuneration and career prospects and is likely to be insecure.¹ There are signs that bodies such as the Research Councils are beginning to address the problems in the public sector.² Some of the responsibility must also lie with industry. Our witnesses revealed that, in many sectors, the scientist was likely to have a career which offered lower financial rewards and fewer opportunities to reach the higher management levels than those of employees of a company working as accountants, say, or marketing managers.³ It appeared that the most successful industries were those which were rewarding their scientists properly.

35. We wish to register our concern "that there are not more women engaged in scientific and technological research, particularly at the higher ranks, in the UK".⁴ We could not help but notice how few of those giving evidence, both oral and written, were women. Given the concerns expressed to us about the shortage of trained personnel, this failure of science to attract and retain over half the population has serious implications. We were encouraged to learn that the OST is already addressing this problem.

"...As part of the work of the Citizen's Charter ... Nancy Lane from Cambridge is looking at the question of women in science. Indeed I am meeting with a group of them in my office—probably you should come along—next week and I hope that we will work closely with Nancy Lane in this area. So we are at one I think on the importance of women in science".⁵

Clearly, there are many organisations such as the DfE, Research Councils, higher education institutions and industry which will have a role to play in increasing the numbers of women in science and technology based occupations; OST should give a clear lead in this.

Public Understanding of Science

36. Public understanding of science is an important influence on school-children in their career choice, on the motivation of scientists and technologists, and the health and effectiveness of the application of science in industry and society generally. The Royal Society, the Royal Institution, the British Association for the Advancement of Science, and many other learned societies and voluntary bodies put substantial effort into this field.⁶ **OST should pay particular attention to this important work and give it every encouragement.**

A Ministry for Science and Technology?

37. In the course of this inquiry we asked witnesses whether it was appropriate for the UK to have a Ministry for Science and Technology. Sir Robin Nicholson pointed to the potential dangers:

"I think the danger of a ministry of research and technology German style is that ministers who are accountable for policy, health, environment, transport and so on no longer have the control over their own science and technology which is there to inform their policy. They are in the hands of another department and so, if their policy is found wanting because there is inadequate science and technology back-up, they simply say "Don't blame me, blame OST and blame the ministry of research and technology".⁷

38. However Sir Robin also saw the CSA as having a role in the R&D policies of other Government Departments.

"As far as other departments are concerned, I think the way ACOST saw the role of the CSA is very much like the role of the director of technology in a large company with many divisions, each of which has its own technical director. He is there to look across the board and to take a second view about the wisdom of what a department is doing...in the last few years...the departments have been unable to respond to the requirements of their ministers because they had inadequate knowledge of the science and technology which lay behind some of the policy issues...one of the roles the Chief Scientific Adviser has is to look at the policy and other issues

¹See, for example, "The Future of the Science Base" published by the Royal Society, September 1992, and Evidence p.207 para 2.26 and the ACOST Submission to OST p.27.

²See, for example, ABRC, Science and Technology: Advice to the Chancellor of the Duchy of Lancaster, published 18 November 1992.

³Q 302

⁴British Ecological Society: from their submission to OST (not printed)

⁵Q449

⁶Evidence pp.175, 215 and 227-8.

⁷Q511

which are facing a minister...and to take an independent view as to whether the department is carrying out sufficient research and development to enhance the quality of that science and technology to meet the minister's wishes".¹

39. We are concerned that, as part of OPSS, the OST may lack the power to fulfil this trans-departmental role. The submission of the Vice Chancellor of Bristol University, Sir John Kingman to the White Paper consultation contains a clear vision for the future.

"...I have long advocated a proper Ministry of Science and Technology, into which I hope the OST will evolve. This will mean that it will have to develop its own full-time scientific capability, or that Ministers have proper in-house advice. This does not mean a large scientific staff, but a properly professional small group of people who understand science but also the role of science in an advanced industrial society...I hope that OST can become strong enough to stand on its own, and cast away the crutches of the ABRC and ACOST. It should listen to the scientific community, but with a sceptical and well-informed ear and with the ability to make up its own mind".²

40. We were struck by the CSA's forecast that

"I believe that at the start of the next century the UK government will require a ministry for Science".³

Although we do not make a forecast on this point we recommend that OST's role should be a strong one. This might lead to its evolution into a Ministry of Science and Technology.

IV SCIENCE BASE ISSUES

Dual Funding

41. The dual funding system remains in place, although there has been a shift in the dual support boundary to give Research Councils responsibility for funding a greater proportion of the indirect costs of the projects they fund in higher education institutions (HEIs). Funding Council funds are now to provide only for the costs of permanent academic staff and premises required for such projects.⁴

42. The basic case for the dual support system is that it provides the working scientist with more than one channel of possible support. The institutional channel is able to support young scientists embarking on a research career, to integrate teaching and research and to be more flexible in judging research. The Research Council channel has wider peer groups, greater possibility of concentrated support and an overall view. A combination of channels, for all its faults, is conceptually sound.

43. In the course of our inquiry we received suggestions that the system should be further changed. ACOST suggested that "the provision of the baseline support for research in universities by OST through the relevant HEFCs would lead to a more coherent approach".⁵ The ABRC on the other hand would like to see the funding for premises and academic staff costs for the research funded by Research Councils transferred from the Funding Councils to the Research Councils themselves. However, the ABRC recognises that such a change is currently impracticable since the system has undergone recent turbulence caused by the shift of the dual funding boundary and the changes made to bring universities and the former polytechnics into a unitary system.⁶

44. Sir David Phillips, the Chairman of the ABRC, explained the reasons behind the ABRC's recommendation:

"we are concerned with all the pressures on the university system, that they should remain capable of carrying out a large proportion of the nation's research. The research council system already spends 70 per cent of its funds in support of higher education research. That means we depend heavily on the research premises in universities, for example. We would wish to see them properly maintained so that we can continue to exploit them. We think that would be best ensured if we were ourselves responsible for that".⁷

¹Q 510

²Evidence p.158, para 13

³Q380

⁴Evidence, p.58, para 4.

⁵Evidence p. 142, para 6

⁶ABRC, Science and Technology: Advice to the Chancellor of the Duchy of Lancaster, p.iv, para 14

⁷Q 546

45. Clearly there is a problem here, but we consider it important, as do our colleagues on the House of Lords Select Committee on Science and Technology, that “universities...continue to be regarded as whole institutions”¹ and we share witnesses’ fears that a further redistribution of funds might make the HEIs overly dependent on the Research Councils.² We therefore agree that dual funding should continue.

46. The HEFCE White Paper submission clearly sets out the advantages of the current system whereby HEFCs’ funds for teaching and research come from the same sources.

“The present arrangement...enables [the HEFC] to allocate funds to universities by means of a single block grant...this provides institutions...with flexibility in the allocation of their resources, and the other advantages...which flow from the block grant. It also makes sense given the substantial integration and synergy between teaching and research within universities.

If, on the other hand, the Council were to receive part of its funds from the DfE for teaching, and part from the OST for research, then this would require separate accountability by the Council for the two streams of funds and it would therefore require separate accountability by institutions to the Council. It would remove the flexibility which institutions at present have, since the two streams of funds would have been voted by Parliament for distinct purposes and would need to be accounted for separately”.³

47. “The identification and pursuit of new areas of research in advance of their support from Research Councils and other funding sources”; and “the provision of resources which allow for the support of new and young entrants to the academic community while they are establishing their research credentials”⁴ were among the principal purposes for HEFC funding identified by the Chief Executive of the HEFCE, Professor Davies. As he told us in written evidence:

“... the Council is almost the only source of general unearmarked research funding available, [the HEFCE] believes that institutions are in the best position to determine the direction of the basic and strategic research which these funds support”.⁵

We believe that it is important that the higher education institutions should retain the ability to fund undirected research.

48. Links between the Research Councils and the funding bodies for the HEIs appear to have been unsatisfactory even when both sides of the dual funding system were under the aegis of the Department of Education and Science (DES). We were told:

(Professor Davies) “The shift from DfE, or DES as it was, to OST had little impact in so far as our interactions before and after the April events were concerned. There is essentially no difference about various funding bodies. What has happened is it has made interactions of the kind my colleagues have discussed, and here I speak on behalf of the other Chief Executives of the Scottish and Welsh Council, and the interactions of the Chief Scientific Advisor more important. We have now set up a mechanism whereby we also meet in a systematic and regular way with him.”

(Dr Rees) “I think I should say that better integration is something we have always wanted but when we shared the same Department of Education and Science this was discouraged”.⁶

49. We agree with our colleagues in the House of Lords that “now the two branches of spending on Dual Support rest in two different departments the needs for some explicit mechanism of co-ordination” becomes necessary.⁷ We note that efforts are already being made to secure co-ordination between the HEFCs and the Research Councils.⁸ The precise nature of that co-ordination will depend on the structure determined for the Research Councils and any advisory body. **We recommend that there should be cross-representation between the HEFCs and any body which assumes responsibility for the Research Councils.**

¹HL (1992-93) 34 para 46

²See Evidence p.222-224; p.261, HEFCE submission to OST, Future of Science and Technology, CVCP submission to the Office of Science and Technology.

³Not printed

⁴Evidence p.58, para 4

⁵Evidence p.59, para 5

⁶Q248

⁷HL (1992-93) 34 para 46

⁸Evidence p.47, 210, QQ 247-8.

Research Council Structures

50. Many of the submissions to the Chancellor of the Duchy of Lancaster suggest changing the current Research Council structures. The two most fully worked out proposals came from ACOST and the ABRC, each of which advocated radically different structures.

51. ACOST recommended a division between curiosity driven research, mission orientated research and experimental development. We cannot recommend this, although the idea is superficially attractive and we have sympathy with Sir Robin Nicholson's desire to protect the funding for curiosity driven research:

"It is absolutely right that people should be able to put forward a research proposal which says, 'I am fascinated by this area of science. I don't understand it and I don't think anybody else does. I want to do research and development to understand better.' That is the message and it is good and it should be funded".¹

52. As the ABRC says:

"If basic research is solely curiosity driven then it becomes strategic the moment a possible relevance, however remote, can be envisaged. Our experience tells us that remarkably little of the work supported by the Science Budget can be defined as "basic" in this way. On the other hand, we see many examples of research output which underpins our fundamental understanding of biology and physics and which has been stimulated by problems arising from applications elsewhere".²

53. The Committee accepts the force of this argument, particularly in the light of the underlying problem in Britain that the quality of basic research is not reflected in a comparable quality of technological competitiveness in industry generally. It would not help to erect a further barrier between basic research and industrial practice.

54. It is clear that there are problems in the current structure. In particular, the Science and Engineering Research Council (SERC) is too large and its responsibilities too various to be satisfactorily managed.³ In addition, despite attempts to encourage collaboration, the current structure means that some projects which straddle research council boundaries find it hard to obtain funds. There were, for many years, difficulties in finding a satisfactory means for funding biotechnology. Although these now appear to have been resolved, this does illustrate that there can be problems in emerging areas of science.⁴

55. The ABRC proposed a re-organisation of the Research Councils on a mission orientated basis.

"The present activities of the Research Councils should be reorganized on a mission-orientated basis, with the whole system overseen by a Board for the Research Councils.

The primary mission of the Research Councils should be:

to respond to the UK's scientific needs by all appropriate means, so as to enhance economic well being and the quality of life

... and these missions should be regularly reviewed and revised as appropriate, by each Council in consultation with its scientific and user communities and with OST".⁵

Each of these mission-orientated research councils would span the whole range from basic to applied research. The Councils they proposed were Biology and Biosphere, Geosphere, Astronomy and Particle and Nuclear Physics, Physical and Engineering Science, Medical, and Social Sciences and Humanities.

56. In oral evidence Sir David Phillips said

"I do not know that it is as radical as it seems. In my view, some of the most successful Research Council activities have been carried on by councils which do regard themselves, and always have regarded themselves, as mission oriented research councils - the Medical Research Council, the Agriculture and Food Research Council, the Natural Environment Research Council regard

¹Q498

²ABRC's Submission to the Chancellor of the Duchy of Lancaster, p. 2, para 6.

³See Report of the ABRC Biotechnology Sub-Committee: A Report to the Chancellor of the Duchy of Lancaster from the Advisory Board for the Research Councils and Evidence pp.47, 208, 217, 220 and 224-5.

⁴See ABRC Biotechnology Sub-Committee, *op. Cit.* and Evidence p.43

⁵ABRC's submission to the Chancellor of the Duchy of Lancaster p.10, annex A.

themselves as mission oriented councils. The SERC which has already been mentioned began by regarding itself as a council that was there to support research generally in higher education but over the years it has become a council with a sort of unwritten mission to support United Kingdom industry and wealth creation. We think it would be better to recognise that".¹

57. We have not had time to take sufficient evidence on this subject to make firm recommendations. Sir David Phillips told us that "the scientific community will undoubtedly now engage in debate on the issue".² We would not wish to pre-empt that debate. However we note that the changes proposed by the ABRC broadly work within existing units; that the headquarters of the Research Councils (except the Medical Research Council) are already located together at Swindon; they already share common services; and that they should be able to make organisational changes with the minimum of disruption. Sir David Phillips told us

"I would hope that if the Chancellor agrees that it was worthwhile [to conduct a cost-benefit analysis of ABRC's proposals] because the recommendations were likely to be implemented, that the ABRC with the Research Councils concerned could accomplish that over the next three months".³

58. Such mission-orientated research councils would give science a more sharply focused role in society, while enabling them each individually to show the mutual dependence of basic and applied research. The "Science Budget" is an amorphous and difficult-to-handle entity for which to establish public, political and governmental understanding and support. Public support could more easily be delivered for each of the missions individually. Moreover it should be possible for government and the political process to shift the balances of effort between different missions, without having to venture scientific judgements on the fruitfulness of particular scientific approaches within missions. We appreciate that such considerations have to be weighed against the acceptability to scientists of the concept, and of the particular missions, and their administrative convenience. Debate will be necessary and we are aware that the scientific community is in a perturbed state. We have no wish to see the uncertainty for working scientists and for science unnecessarily prolonged.

59. We recommend that the concept of mission orientated research councils should be more fully debated, the missions more fully worked out, and the cost-benefit studies carried out. After conclusions are reached, any changes should be made with expedition. The system should then be granted a period of stability.

Advisory Structures

60. In the course of our inquiry we received many criticisms of the current advisory system which was described as a "maze of unnecessary complexity".⁴ One of the most fundamental of these is that there is little consultation among the bodies variously responsible for research funding within government and, as the Association of Medical Research Charities points out, outside it. The Economic and Social Research Council (ESRC) for example, suggests there is a need for a more broadly based institution to replace the ABRC:

"...representative of the universities, the research councils and government departments as the principal purchasers and providers of science base research, ...there should also be representation of research customers".⁵

61. Further criticisms are that the current structure concentrates too much, or too little, on the problems and needs of industry, that it is not open enough and that too much of its advice is given in confidence.⁶

62. Clearly any change in Research Council structures is likely to have an impact on the advisory structures needed. For example, as the House of Lords' Science and Technology Committee has said

"If a unified research council structure were to be adopted at some time in the future, there would probably be no need for ABRC to continue as an intermediary between the single research body and the OST. Moreover, if ACOST is to continue as a source of strategic advice there would be little left for ABRC to do".⁷

¹Q527

²Q539

³Q540

⁴Evidence p.257 para 5.

⁵Evidence p54 para 8.

⁶See, for example, Evidence p.54, 88, para 5(iii) p.180 and p.157

⁷HL (1992-93) 34, para 34

However, there are some considerations which any review of the advisory structure will have to take into account.

63. The first is the nature of the advice to be offered. Many witnesses, especially those from the Research Councils, felt there was a clear distinction to be made between advice on the allocation of resources within the science base and advice on wider issues.

"[One] body should give advice to the Minister about expenditure on the Science Vote...above that one does need, at the present time, a policy advisory group, in other words to look across the broad range, not only of the strategic science funded by the OST but also the research in the Government Departments and in industry and ask the questions: "Is the balance correct? Are there gaps? Are we emphasising the right areas?" That is a very distinct role from the role of an ABRC like body".¹

Witnesses also identified a further need for advice in the form of studies of particular topics.

64. Many problems might be avoided by increasing clarity about the nature of the advice sought and its status. Sometimes advice needs to be confidential, sometimes independent and public, sometimes clearly advisory, and sometimes effectively executive. But it should always be clear in which mode an advisory body is working.

65. Although it may not be possible to "be completely open all the time",² as Professor Blundell the Director General of the AFRC, told us, past reluctance to publish advice has led to uncertainty in the science community.

"I believe the advice coming at that level and also advice at the higher level is very much advantaged if it is published because it creates confidence within the scientific community. I think we have had a lack of confidence through a lack of knowledge and quite often the heads of Research Councils have been in a position where they have been supporting the view that is generally supported in the community but because the advice has not been published it is not clear that position is maintained".³

Currently, "all ACOST's work is initially confidential although permission to publish is usually sought".⁴ **In our view, the presumption should be that advice from advisory bodies, except where explicitly given in confidence, should be published,** and that there should be no need to request permission for its publication.

66. We would go further and recommend that the government should, where appropriate, reply to published advice from its advisory bodies. If the advice is good, there will be no embarrassment in accepting. If advice is consistently rejected, then the advisory body offering it must be made aware of the background to such rejection.

Strategic Advice

67. Given the fragmented nature of government spending on science there is a case for creating a strong advisory body with the task of advising "on strategic policy issues of national importance".⁵ Since, as we discuss below, many representatives of industry feel that their view is not taken into account sufficiently in formulating science policy, **there is a case for an advisory council which would absorb the role of ACOST, but which would be charged with taking an overview of science and technology activity in the United Kingdom.** The Advisory Council's remit should cover industry, the science base, education, and research for public policy, and the relations and interactions between them. The body should have members of sufficient standing to ensure that the Government listens to its recommendations.

68. Concern has been expressed about the apparent narrowness of representation on existing advisory bodies; as the Institution of Professionals, Managers and Specialists (IPMS) told us:

"The exclusively male membership of ACOST is drawn almost equally from the worlds of industry and academia, together with the chairmen of the UFC and ABRC. It can not be possibly argued that there are no suitably qualified women who could not add to the deliberations of the council. In addition, the Council has no members drawn from consumer

¹Q204

²Q210

³Q 209.

⁴Evidence p. 132, para 4.

⁵Evidence p. 223, para 5.

or environmental groups, research organisations or trade unions. If the government is to receive relevant and balanced views on the direction of science policy the membership of the council must be drawn from a wider cross section of the scientific community".¹

69. We are especially concerned that the under representation of women in the advisory structure should be corrected. We agree with the CSA that it should be the overriding factor that all those on the Advisory Council should be there because they have a positive contribution to make.² Nonetheless, we recommend that any new body should be more broadly based than heretofore.

70. We have considered whether it is appropriate for such a Council to be chaired by the Prime Minister or the Chancellor of the Duchy of Lancaster. This would have the advantage of ensuring that the Advisory Council's views were heard at the highest levels. However, on balance, it is preferable that the Council should be seen to be independent of government. Accordingly, given the importance of industry to the United Kingdom's economy, it would be welcome for a representative of technology based industry to take the Chair of the Advisory Council. In all events the chair should be taken by a person with experience of science and technology and their applications, and the capacity to draw together the different areas of concern in science policy. To ensure that the Advisory Council's views are heard it should report on its activities directly to the Prime Minister at least once a year.

71. The Advisory Council would concentrate on the "really big issues".³ Other types of policy advice, such as advice on the allocation of resources, could be provided either through free standing bodies or through committees reporting to the Advisory Council itself. Although the use of committees might blur the distinction between different types of advice it would have the advantage that the Advisory Council was informed through the work of its committees.

Advice on the Allocation of Funds

72. Some witnesses suggested that the establishment of OST had removed the need for advice on the allocation of funds for the Research Councils since the OST simply allocates funds to the Research Councils directly. Sir David Phillips explained why, in his view, such advice remained essential:

"The Research Councils, of course, have their real figures for the coming financial year and their planning figures for the two years after that and the ABRC sees it as the responsibility of the Research Councils to fund those scientific and technological topics which they regard as being of the highest priority from their baseline funding. Now, they always have other things which they regard as important to do which they cannot fund from their baseline funding, so they make bids during the public expenditure round for additional funds for these additional activities. By definition these additional activities must be of lower priority than those that they are funding within the baseline, that is, within a research council. When it comes to the ABRC, the ABRC has to wonder whether the bids that are being made by one Research Council are more or less important than the bids being made by another Research Council and progressively whether the bids made by one Research Council are of greater or lower priority than the baseline funding of some other Research Council . . . in effect, that could be done, if you like, by OST insisting on a similar process, which I am sure they would. But then who would make the judgment about whether, as I have said, an increase in funding for molecular biology is more or less important than an increase in funding for material science, civil servants or independent scientific advisers? I believe the latter is extremely important, given that at the end a minister would have to make a decision about it".⁴

73. The Heads of Research Councils agreed with him,⁵ although many other witnesses, including the Royal Society, considered that the OST might now be in a position to perform the ABRC's role in allocating money directly.⁶ Other witnesses, such as the CVCP, felt that there was no longer any need to separate the roles of ACOST and the ABRC.⁷ We received much evidence criticising the narrow representation on the ABRC.

74. We do not accept that independent scientific advisers, however distinguished and disinterested, should have the last word on the broad distribution of research funds. There must

¹Evidence p. 192, para 44.

²Q 446.

³HL (1992-93) 34, para 38.

⁴Q 526.

⁵QQ 203-208.

⁶Evidence p.223.

⁷Committee of Vice-Chancellors and Principles of the Universities of the United Kingdom: *Future of Science and Technology: CVCP submission to the office of Science and Technology*, p. 4 (not printed)

be room for others in society to have a say. Certainly judgments in particular fields, applications, and missions of science and technology should be made by well informed scientists and technologists. The mission-orientated organisation of Research Councils offers a level at which wider social and lay political judgment can have a role in allocating resources between different missions and therefore research councils, without venturing into judgments best left to scientists.

75. The balance could be well met if a Committee of the Advisory Council, constituted after the pattern of the ABRC today, was chaired by the Government Chief Scientific Adviser, who would give the Chancellor the necessary advice on the funding of the Research Councils.

Specific and Independent Advice

76. It does not seem to us appropriate for the Advisory Council to prepare specialist reports on particular topics. We recommend that when such reports are needed they should be commissioned by OST or the Advisory Council itself. In this context we note that the Royal Society and the Royal Academy of Engineering have recently joined with the Conference of Medical Colleges and the British Academy to establish a policy advisory group¹ and it may be appropriate, on occasion, to seek advice from them. We recognise that, as our colleagues in the House of Lords remarked, the learned societies' "strength is their independence and their initiative should be unfettered".² Accordingly, there may be cases where OST or the Advisory Council feels it more appropriate to set up working groups of scientists to deal with particular topics. Professor Gibbons of the Science Policy Research Unit at Sussex University suggests that "Government . . . should acquire the expertise it needs at the appropriate levels on a case by case basis and deconstitute it when the job is done".³ **The additional budget which we recommend that OST should have⁴ would enable the Office to commission this type of advice from the learned bodies or any other sources.**

Advice from Young Practitioners

77. If the Advisory Council is to carry the weight it should, then it will necessarily be composed of the "Great and Good". The Committee of Directors of Polytechnics suggests that any advisory structure

"should be capable of bringing into play the advice of young scientists and technologists since they are more likely than older colleagues to be both fully up to date in their disciplines and unaffected by political views and prejudices".⁵

78. We agree that these younger practitioners are likely to be the first to be aware of issues of importance for the future and that any advisory structure should include them. We were encouraged to hear that Profesor Stewart, the CSA, was already making efforts to ensure he remained in touch with scientists "at the bench", but we suggest that there should be some more formal input by which priorities and issues might be suggested by those most closely involved, including those who do not necessarily share "establishment views". This would have the added advantage of giving an early experience of policy making to those who may in later life find themselves members of the Advisory Council.

V INTERNATIONAL COOPERATION

79. In the course of this inquiry we received much evidence on matters which will be crucial for OST to consider. One of these, with which OST is already dealing, is international collaboration. The problems in this field are not new; indeed they were extensively addressed by our colleagues in the House of Lords as recently as 1991.⁶ We hope that the establishment of OST will act as a catalyst to resolve some of these difficulties even in areas where the Office does not have lead responsibility.

¹NAPAG: National Academies Policy Advisory Group.

²HL (1992-93) 34, para 39.

³Evidence p. 242.

⁴See para 29 above.

⁵Evidence p. 164, para 5.

⁶Select Committee on Science and Technology, Second Report 1990-91, *International Scientific Programmes*, HL 24-1.

European Community Collaboration

80. Our witnesses were concerned that European Community collaboration was not as beneficial as it might be. Academic witnesses suggested that European programmes might distort domestic priorities and stressed the financial difficulties which arose both from the Treasury rules on attribution and EC rules on charging for overheads.¹ They were also concerned that the peer review system was not sufficiently rigorous.²

81. There was also concern among our industrial witnesses. The EEF stated:

"we do not get optimum benefit from international collaborative programmes for various reasons inherent in their design and organisation. These include bureaucracy, slowness and delay; the incumbrance of less technologically developed partners; and the danger of inadvertently sharing proprietary technology".³

82. At a recent symposium on European Community Research and Development the Parliamentary Secretary at the Office of Public Service and Science said "while most universities have research teams which have participated or are currently participating in Community programmes, it is significant that 60 per cent of our top 100 R&D spending companies have not participated in EC research programmes. Even allowing for the fact that EC programmes do not cover all areas of research—pharmaceuticals, for example, are excluded—I find the result disappointing and I am sure the Department of Trade and Industry and the Office of Science and Technology will wish to consider this further".⁴

83. If this is a serious issue, a remedy might be to ensure that EC programmes meet the needs identified by industrial users. In the view of witnesses, this should lead to greater participation.

Intellectual Property Rights

84. As far as IPR is concerned, we are pleased to note that the OST has already published a report on this issue which makes a number of recommendations which we would support.⁵ These include ensuring that education in intellectual property matters is widely available, strengthening the units responsible for industrial liaison within the public sector and relating funding to successful handling of technology transfer.

85. Nevertheless, the Association of Medical Research Charities stated that "the UK is enormously disadvantaged by current laws regarding intellectual property".⁶ In evidence from the President of the Board of Trade, officials told us:

"...the US patent system which allows prior publication is under review and there are currently negotiations at international level...to bring various national systems into line"

and

"The current sense is that the US is looking very hard at coming into line with what the rest of the world is doing".⁷

We believe it would be more advantageous to public sector researchers if Europe were to adopt the US concept of a "grace period" within which a researcher can make a patent application without his or her own previous publication preventing patentability.

Attribution

86. Committees of both Houses have drawn attention to the problems caused by the Treasury practice on attribution whereby responsibility for Community expenditure on research and development is allocated to individual departments.⁸ The Government reply to the House of Lords Science and Technology Committee defended current practice.

"The cost to the UK of spending by the EC must be found from the same finite resources as provide for direct spending by government departments on R&D, and on all other public expenditure. The arrangements are designed:

(a) to ensure that public expenditure resulting from EC activities is evaluated and accounted for on the same basis as other public expenditure;

¹Evidence pp. 48, 50, 154.

²Evidence pp. 44, 50.

³Evidence p. 84, para 4; see also Evidence p. 179 and p. 214, para 3.4.

⁴Cabinet Office News Release, OPSS B4192.

⁵Intellectual Property in the Public Sector Research Base, HMSO, September 1992.

⁶Not printed.

⁷QQ 124-126.

⁸See HC (1990-91) 127, paras 21 to 24, HL (1990-91) 24-I, paras 8.2 to 8.13.

(b) to contain the consequences for UK public expenditure of growth in EC spending; and (c) by placing responsibility on departments for EC expenditure, to maximise the quality and value for money of EC spending; to seek as effective control as possible of spending at the EC level; and to ensure, as far as possible, that EC expenditure complements rather than duplicates domestic public expenditure.

The public expenditure arrangements provide scope and flexibility, within the PES, for a thorough consideration of the implications for domestic expenditure of EC R&D".¹

Nevertheless concern still remains, and we cannot discount the complaints of our witnesses and the disquiet of the House of Lords Science and Technology Committee. The AFRC clearly believes that the practice of attribution distorts scientific research in the UK, even though individual researchers may benefit from participation in European Programmes:

"A major concern is the EuroPES system whereby the costs of EC programmes are attributed to UK Government departments. Agreement to larger EC programmes in basic science can lead to a reduced Science Budget and less support for domestic programmes to which research councils might attach higher priority. Of course UK research teams win back EC project funds, but this is not necessarily for research judged to be of high priority by research councils. And there is no guarantee of continuity, with consequent adverse effects on scientists' careers. This is an unsatisfactory use of Science Budget funds".²

We note the remarks of the President of the Board of Trade that:

"...it will not surprise you if spending ministers take one view and the Treasury take another. That will undoubtedly be the case in Europe, but at the moment we have a given policy and I am here to defend it".³

It is our view that the problems of attribution need to be resolved.

The Fourth Framework Programme

87. In those areas where OST can take the lead we trust that the appointment of a Minister of Science will provide continuity and allow the United Kingdom to be more effectively represented in Brussels. We are encouraged by the efforts that are clearly being made to ensure that the European Community Fourth Framework Programme for science and technology is successful and the concerns we have noted are addressed:

"Next year negotiations take place on Framework Programme Four and the UK, along with Germany and France, has put in detailed papers which have been made publicly available as to how we think this programme should be shaped. We have taken on board in particular the objective of standards and marketing aspects of the programme, and we are now working on proposals for the Commission on how the management of the programme should be improved, including how the technology transfer arrangements should be improved".⁴

88. The Commission's working document on the Fourth Framework programme states

"The technological backwardness of some Member States imposes a burden on the technological balance sheet of the Community as a whole and any progress which is achieved by these countries in the field of RTD and innovation will constitute net progress for the Community as a whole".⁵

There appears to be some pressure to pay more attention to cohesion (that is, the desirability of bringing the more scientifically backward countries of the Community up to the general standard). This would be a cause for concern if it meant that considerations of scientific excellence were undermined in making grants from the Framework Programme

89. **We recommend that the OST does all it can to ensure that European Community S&T programmes only cover things which cannot be done by Member States' own programmes (that is, the principle of subsidiarity should always apply). We also recommend that international peer review, of the kind which the leading Member States use for their own programmes, is always employed for EC programmes.**

¹International Scientific Programmes: Government Response to the Second Report of the House of Lords Select Committee on Science and Technology 1990-91 Session. Cm 1629 para 18.

²Evidence p. 48, para 27.

³Q 101.

⁴Q 460.

⁵Com (92) 400 Final, p. 3, section 5.

Exchange Rate Fluctuations

90. The United Kingdom subscribes to a number of large international facilities. Many of these subscriptions are treaty obligations. As the House of Lords Committee says

“Where a contribution to a large facility is denominated in currency other than sterling the effect of movements in the exchange rate have to be borne by the contributing agency. In the cases where the contributing agencies are research councils adverse movements in the exchange rate can have unforeseen and serious consequences for their cash-limited budgets”.¹

91. In the past Committees of both the House of Lords and the Commons have criticised this arrangement.² The problem became less urgent when the UK was a member of the ERM, but recent events have changed the situation dramatically. The costs of a fluctuating exchange rate fall most heavily on the SERC and, to a lesser extent, the MRC.³ Dr Hughes told us that the recent devaluation means that next financial year SERC will have to pay approximately £10 million over the amount it previously budgeted for international subscriptions. No increase in the Science Budget has been made to compensate for this.

92. We agree with our colleagues in the House of Lords that it is

“grotesque that Research Councils should be expected to cover their [currency] costs through playing on the currency markets, like a commercial organisation”⁴

93. We note that the Science Budget in both France and Germany is protected from the effect of fluctuations in currency.⁵ **We recommend that since the withdrawal of sterling from the ERM has exposed the Research Councils to changes in their budgets caused by currency movements alone some means should be found whereby fluctuations in subscriptions to international facilities do not impinge on the Science Budget.**

94. One means of accomplishing this might be to transfer responsibility for such subscriptions to the Foreign Office or to the Treasury. We see the attractions in this, but we are aware of Dr Hughes’s warning:

“We would not advocate that everything is accepted lock, stock and barrel say by the Treasury or by the FCO, because the object of these subscriptions actually is to secure access to scientific facilities. The purpose of spending the money is for carrying out science... we believe therefore that the purpose for which these subscriptions are intended should be seen and looked at by those bodies that are concerned with science”.⁶

Accordingly, we recommend that responsibility for international subscriptions should remain with the OST.

VI SCIENCE AND INDUSTRY

Innovation and Competitiveness

95. In this Report we have chosen to concentrate upon the organisation of the OST itself and its relationships with other government departments. However, in the course of our inquiry we received a great deal of evidence addressing the Chancellor of the Duchy’s questions on wider issues, in particular on the factors affecting the United Kingdom’s technological competitiveness. For the present, however, we feel it is appropriate to restrict ourselves to simply drawing attention to the concerns raised by our witnesses.

96. These concerns that innovative industry in the United Kingdom is hindered by a peculiarly British “short-termism”; that government support for innovative industry is poorly focused and, in particular, that the rigorous application of the “near-market” principle means that British industry receives less assistance than do competitors in other countries, and that the strength of United Kingdom Science Base, which is vital for industry, is being gradually eroded. **These complaints indicate that it will be imperative for the OST to work closely with the DTI and other departments in fashioning policies which will support science, technology and industry. We shall investigate these more fully in our next inquiry.**

¹HL (1990-91) 24-I, para 8.19

²First Report, from the Education, Science and Arts Committee, Session 1984-85, *The Future of the Science Budget*, HC 46-1, para 66, HL (1990-91) 24-I, paras 8.19-8.24, para 9.29.

³Evidence pp. 50-51.

⁴HL (1990-91) 24-I para 8.35.

⁵*Ibid* paras 8.22-8.24.

⁶Q 287.

97. Our first concern is to ensure the importance of innovation for our national economy is fully appreciated. We agree with our colleagues in the House of Lords that “the application and exploitation of science is of paramount importance to the economic welfare and industrial competitiveness of the nation”.¹

98. The Chancellor of the Duchy of Lancaster has asked

“Do we have an agreed measure of the capacity of an industry, or a firm, to innovate? Do we really know whether our firms are getting better or worse at innovation? Do technology based firms last longer?”²

We found no substantial replies in the evidence. The question might have been better phrased to ask “Do we have an agreed measure of the success of an industry, or a firm, in innovating?” This has been extensively explored. The general approach has been to attribute to “technical progress” or to “increased non-price competitiveness” that increase in production or productivity that cannot be attributed to increases in labour or capital employed.

99. Any study of British innovation would have to take into account the factors which militate against the sustained investment in R&D which might provide a basis for future growth. The President of the Board of Trade maintained that “it is the vagaries and unpredictabilities, the stops and starts” in the economy that “have broken the sense of confidence and that attitude of long term policy making that has been characteristic of some of the more successful capitalist economies.”³ However, Dr Richards of the CBI disagreed:

“I think that the President of the Board of Trade’s views are not ones that we would share. Short-termism is somehow part of our culture...It may seem worse in bad times, but there is no doubt that investors generally feel that quick results are needed and there should be a real time impact on the profit and loss account. Our view, which I believe would be shared by all technology-based industries, is that you need substantial investment together with short-term and long-term objectives. It is continuity that will provide us with the answers to intractable problems”.⁴

100. At least some of this pressure comes from shareholders; one witness told us

“...we are a high-tech electronics business competing in a world market. Fifty per cent of our products go to the export market. Last year we increased our R&D expenditure by 50 per cent. That was quite a dramatic step in view of the recession. Our profits were level; we did not increase them. A survey of our shareholders revealed that 85 per cent wanted a dividend ...If I were to double the R&D spend again - and we certainly have an opportunity to do it in a fast-moving market - we would probably be acquired by an offshore company who would say, “They have spent all that money and they are ready to turn it into products. We can get it very cheaply because they are not making any money”.⁵

Some industries have succeeded in educating their shareholders; in pharmaceuticals in particular lead times are very long since “some drugs once discovered may require a 12- to 15-year development period,”⁶ but we are concerned that some sectors, particularly those with a high engineering input, find shareholder attitudes a major constraint on their ability to invest in research and development.

101. It is notable that many witnesses told us that shareholders in other countries were prepared to take a more long-term view. The Chemical Industries Association (CIA) maintained:

“It is our firm belief that the problem in turning research results into wealth-creating technologies does not lie in a lack of new ideas: the problem lies in the capability of the UK manufacturing sector to exploit advances in knowledge and turn them into value-added products and processes. The UK has a strong and well regarded science base, but we cannot hope to succeed if advances in research have to be exploited abroad”.⁷

102. On December 3rd the ‘Times’ reported:

“GEC shares fell 9p to 263p as several City electricals analysts downgraded their full year forecasts to about £840 million, having underestimated GEC’s spending on research and development.”

¹HL (1992-93) 34, para 1.

²See Evidence HC 228 Vol. II for full list of questions.

³Q 73.

⁴Q 271.

⁵Q 271.

⁶Q 271.

⁷Evidence p.81, para 3.

We are disturbed by this evidence of the failure of United Kingdom institutions to support companies which take a long-term view of research and development. We will return to this subject in our next inquiry.

Government Support for Industry

103. Witnesses also pointed to the differing needs of business sectors which they felt were not sufficiently appreciated in government schemes. The United Kingdom has successful chemical and pharmaceutical industries which have strong links with the academic world. Representatives of other industries, particularly those with considerable engineering activity, felt that much of the government spending intended to help businesses was misapplied.

104. Many witnesses suggested that problems arose from the use of a limiting concept of "technology-transfer" as a simple linear process, rather than as the complex interactive process it was in fact. The EEF told us:

"Innovation is not merely a linear process moving from research through to market. It also involves the incremental development and improvement of existing products and processes. The British culture emphasises invention by individuals of completely new concepts from basic principles. Too little effort is put into application and execution...In consequence, the more complex the process of bringing an invention to the market, the less likely it is to succeed in the UK".¹

It is not our purpose to suggest an alternative to the linear model of technology transfer here; however, the government must ensure that its policies do not inadvertently exacerbate the situation, by applying an appropriate model for the process they wish to promote.

105. There was special concern at the application of the principle, dating from 1987, that the UK should not fund "near-market" research. One witness told us that UK policy toward support for industry was

"founded on two mutually contradictory premises

- projects must not be near-market (to avoid being seen as subsidy);
 - public funding must not exceed 50% of the costs (in order to use market forces to pick sensible projects).
- ...the latter [premise] requires market forces to be used to select projects which are, according to the former, not of interest to the market".²

106. Sir John Fairclough, the former Chief Scientific Adviser who had been heavily involved in introducing the "near-market" policy, has publicly said that it has been misinterpreted in a way which has "driven, even deeper, the wedge between the academic and industrial communities".³ The President of the Board of Trade acknowledged that there had been some problems:

"I think it is now understood that in the sense that there is a market for all these things, if you produce a government grant machinery which removes itself from the near market, very rapidly people applying for the grant realise the way to get grants is to concentrate on non-near-market activities and that makes it easier to get the grants and you find yourself being driven further and further away from the market as people see this is where the thrust of policy is intended to go. This is an issue we have to look at. I am fully aware that the moment you move back towards the market you may find yourself doing things that the companies themselves should be doing".⁴

107. We appreciate that it is inappropriate for government to fund developments which would otherwise be paid for by the private sector, but it seems clear that current policy is applied too rigidly and has had a distorting effect. **We recommend that OST and DTI work together to ensure that the near market policy is re-examined and that government policies do not prevent the funding of valuable applied research.**

Other Research Grants

108. There was general agreement among our witnesses that many of the programmes currently employed to encourage innovation and collaboration between industry and academia were excellent. The LINK programme and the Teaching Company Scheme were particularly

¹Evidence p.83. See also pp.153, 155, 160-61.

²Evidence p. 160, para 3.

³This remark was made at a Foundation for Science and Technology lecture on "Science and Technology: Building for the future" on 9 July 1992. Reported in a special issue of "Technology Innovation and Society".

⁴Q 97.

praised.¹ However, witnesses had reservations about the extent to which government programmes addressed the need of small and medium enterprises and we were told “the complexity of UK grant systems deters all but the most determined and organised (usually the large companies whose need may not be the greatest)”.²

109. There were also suggestions that currently there were too many initiatives, in some cases spread between different departments, and that funding for each initiative was inadequate. According to one witness “the general impression created by Government activity is that it lacks focus and is “penny-pinching” compared to our international competitors”.³ Another commented:

“...perhaps we are suffering from a plethora of initiatives, all starting from good intentions but modestly funded. An alternative would be for less initiatives in broad strategic areas, with more substantial funding.”⁴

It would be appropriate for OST to have an overview of schemes intended to encourage innovation in industry to ensure that departments worked to common policies and that all schemes were part of a coherent framework for providing industrial support. OST will have to work closely with DTI to ensure this.

The Health of the Science Base

110. Many industrial witnesses echoed the Association of the British Pharmaceutical Industry (ABPI) which cited “the continuing fall in the funding of the science base by government”⁵ as one of its major concerns. The CIA commented:

“The UK has a strong and well regarded science base, but we cannot hope to succeed if advances in research have to be exploited abroad. It would be wrong however, to be complacent about the strength of the UK science base. Concerns are emerging that investment in capital equipment is inadequate, that there is insufficient consistency in funding and that patterns of funding do not adequately reflect industrial requirements”.⁶

111. While many witnesses were concerned that government funding was concentrated on basic research to the detriment of applied research, others stressed the need to retain a capacity to respond to scientific curiosity. The CIA told us

We strongly believe that government...has the responsibility for ensuring that adequate provision is made for sustained research effort in areas of fundamental science which underpin industrial activity.”⁷

and Amersham International went further still:

“The commercial innovation of tomorrow is based on the basic research of today, and it is our belief that the appropriate place to do the basic research is our university system. The more support given to basic research now, the more likely it is commercial spin-offs will be generating profits in 10 years time. The funding of applied research (so-called “near market”) to the detriment of basic research restricts enthusiasm and creativity and removes the pressure from industry to carry out the legitimate development work”.⁸

Clearly there is a difficult balance to be struck here. It may be that a relaxation of the rules on “near-market” research would encourage industry itself to carry out applied research and so reduce the pressure on the research system to become involved in this area.

Transfer of Knowledge

112. While witnesses’ requirements from publicly funded science varied according to the sector from which they came, there was general agreement that the ideal situation was one in which knowledge flowed freely from research to industry. In this context, many witnesses stressed that the most efficient means of transferring knowledge was the transfer of people or by face to face contact between researchers.

¹Evidence pp.154, 202-3, 215 and 220.

²Evidence p. 176, para 8.

³Evidence p. 167.

⁴Evidence p. 181.

⁵Evidence p.87 para 4.

⁶Evidence p. 81, paras 3 and 4.

⁷*Ibid*, para 2.

⁸Evidence p. 176, para 4.

113. We were impressed by our witnesses' emphasis on the international nature of much scientific endeavour. There was a consensus that it was essential for United Kingdom industry to tap into work outside the UK since the UK accounted for only five per cent of the world's scientific capacity.¹ Dr Richards of the CBI told us "it is essential that if one wishes to be competitive nationally let alone internationally, one needs to have one's finger on the pulse of science and all its aspects throughout the world."² The EEF complained that "there is reluctance to adopt and improve on ideas generated elsewhere",³ and we were struck by the fact that a representative of the pharmaceutical industry, which is outstandingly successful, told us: "Our industry is pretty international...we see no international barriers and feel free to take the advantages that the science bases confer no matter where they are."⁴

114. It would clearly be beneficial if the United Kingdom was more successful in making use of discoveries made elsewhere in the world, and the government should consider whether it can take any initiative to improve inward technology transfer. However, such improvement should not be made at the expense of the national science base. Dr Caton of Rhône Poulenc told us:

"When it comes to having close collaboration with universities through one's own laboratories one needs for geographical and practical reasons to have a very strong local science base...Also, when it comes to deciding where to site manufacturing and research nowadays an international company will look closely at the strength of the local science base. They will ask themselves whether they should invest in Britain or somewhere else and look at the science base. That means jobs not just for scientists but for all other people who go with them".⁵

and the Chief Scientific Adviser agreed with him:

"I am sure that British companies will have to make use, and do make use, of the best R&D base wherever it is anywhere in the world, but we must get more than our pro-rata share, which will deliver more wealth-creating industries to our country. I think it is possible for us to do that by having a strong infrastructure in S&T".⁶

VII CONCLUSION

115. We trust that the establishment of the OST indicates a collective recognition that an effective science and technology policy will be vital for the United Kingdom's future prosperity, and that the new department's legitimate interest in all government funded research and development will not be frustrated by departmental jealousies.

116. We will look closely at the development of the OST, and its relations with other departments in future. But improving the structures by which government policy will be formed and carried out will not be enough to solve all current problems. It is important that science and technology is adequately funded and that the science base is sustained. In some ways, stability in funding is more important than generosity since short term cuts fall unduly heavily on new projects.⁷ It is inevitable that the OST's success will be measured, to some extent, by its success in increasing expenditure on civil research and development to match that of the United Kingdom's competitors,⁸ and this should be one of its objectives.

117. In the course of this Report we have come to the following conclusions and recommendations.

We consider that, in time, OST should have the power to shape science policy. (paragraph 7)

We consider that [when science related policy issues transcend the boundaries of a single department] the responsibility must lie with OST. (paragraph 11)

The experience of the Next Steps team has shown that small units can be effective providing there is a political will to make them so. (paragraph 14)

¹Q 287 and Evidence p. 224.

²Q 287.

³Evidence p. 83.

⁴Q 287.

⁵Q 287.

⁶Q 422.

⁷See Select Committee on Science and Technology, Third Report of Session 1990-91, *The Science Budget 1991-92*, HL 37-I, paras 2.25-2.27.

⁸See HL (1992-93) 34, paras 19-22.

We consider that the Chief Scientific Adviser should have a role in the PES round at departmental level, on inter-departmental issues and in determining the total of government funded research and development and its distribution. We hope that as the OST grows in authority that this role will become more significant. (paragraph 18)

We believe that other existing mechanisms could also be enhanced to provide a stronger central direction for science ... by giving a committee of the departmental Chief Scientific Advisers, chaired by the CSA, a lead role in considering priorities for government spending. (paragraph 19)

In ... case [of disagreement between the OST and another department on a particular project] we would urge that the opinion of the CSA and the departmental CSAs as a group should be sought. (paragraph 21)

... It may be felt inappropriate to burden the CSA with the formal responsibilities of an accounting officer. However some means should be found to ensure that the Permanent Secretary of OPSS cannot intervene in matters concerning science policy without the CSA's consent. The Accounting Officer's role of the Permanent Secretary should not extend to the determination and distribution of the science budget, but should merely cover the propriety of expenditure. (paragraph 26)

We recommend that the CSA's role as Government Chief Scientific Adviser be made clear in the title of the post and its grade. (paragraph 28)

We recommend that the CSA be Grade 1A. (paragraph 28)

OST's position should be strengthened by providing it with a budget for research over and above the monies allocated for the science budget. (paragraph 29)

We recommend that OST should help to formulate policy on science education at all levels. (paragraph 33)

Clearly, there are many organisations such as the DfE, Research Councils, higher education institutions and industry which will have a role to play in increasing the numbers of women in science and technology based occupations; OST should give a clear lead in this. (paragraph 35)

OST should pay particular attention to this important work [on increasing the public understanding of science] and give it every encouragement. (paragraph 36)

Although we do not make a forecast we recommend that OST's role should be a strong one. This might lead to its evolution into a Ministry of Science and Technology. (paragraph 40)

Clearly there is a problem [in the dual funding system], but we consider it important, as do our colleagues on the House of Lords Select Committee on Science and Technology, that "universities ... continue to be regarded as whole institutions" and we share witnesses' fears that a further redistribution of funds might make the HEIs overly dependent on the Research Councils. We therefore agree that dual funding should continue. (paragraph 45)

We believe that it is important that the higher education institutions should retain the ability to fund undirected research. (paragraph 47)

We recommend that there should be cross-representation between the HEFCs and any body which assumes responsibility for the Research Councils. (paragraph 49)

We recommend that the concept of mission orientated research councils should be more fully debated, the missions more fully worked out, and the cost-benefit studies carried out. After conclusions are reached, any changes should be made with expedition. The system should then be granted a period of stability. (paragraph 59)

In our view, the presumption should be that advice from advisory bodies, except where explicitly given in confidence, should be published. (paragraph 65)

There is a case for an advisory body which would absorb the role of ACOST, but which would be charged with taking an overview of science and technology activity in the United Kingdom. (paragraph 67)

We are especially concerned that the under representation of women in the advisory structure should be corrected. We agree with the CSA that it should be the overriding factor that all those on the Advisory Council should be there because they have a positive contribution to make. Nonetheless, we recommend that any new body should be more broadly based than heretofore. (paragraph 69)

The additional budget which we recommend that OST should have would enable the Office to commission advice [on particular topics] from the learned bodies or any other sources. (paragraph 76)

We believe it would be more advantageous to public sector researchers if Europe were to adopt the US concept of a "grace period" within which a researcher can make a patent application without his or her own previous publication preventing patentability. (paragraph 85)

It is our view that the problems of attribution need to be resolved. (paragraph 86)

We recommend that the OST does all it can to ensure that European Community S&T programmes only cover things which cannot be done by Member States' own programmes (that is, the principle of subsidiarity should always apply). We also recommend that international peer review, of the kind which the leading Member States use for their own programmes, is always employed for EC programmes. (paragraph 89)

We recommend that since the withdrawal of sterling from the ERM has exposed the Research Councils to changes in their budgets caused by currency movements alone some means should be found whereby fluctuations in subscriptions to international facilities do not impinge on the Science Budget. (paragraph 93)

. . . We recommend that responsibility for international subscriptions should remain with the OST. (paragraph 94)

[The complaints of our witnesses] indicate that it will be imperative for the OST to work closely with the DTI and other departments in fashioning policies which will support science, technology and industry. We shall investigate these more fully in our next inquiry. (paragraph 96)

We are disturbed by ... evidence of the failure of United Kingdom institutions to support companies which take a long-term view of research and development. We will return to this subject in our next inquiry. (paragraph 102)

We recommend that OST and DTI work together to ensure that the near market policy is re-examined and that government policies do not prevent the funding of valuable applied research. (paragraph 107)

It would be appropriate for OST to have an overview of schemes intended to encourage innovation in industry to ensure that departments worked to common policies and that all schemes were part of a coherent framework for providing industrial support. OST will have to work closely with DTI to ensure this. (paragraph 109)

LIST OF TERMS AND ABBREVIATIONS

ACOST	—	Advisory Council on Science and Technology
ABPI	—	Association of the British Pharmaceutical Industry
ABRC	—	Advisory Board for the Research Councils
AFRC	—	Agricultural and Food Research Council
CBI	—	Confederation of British Industry
CIA	—	Chemical Industries Association
CVCP	—	Committee of Vice-Chancellors and Principals of the Universities of the UK
CSA	—	Chief Scientific Adviser
DES	—	Department of Education and Science
DfE	—	Department for Education
DTI	—	Department of Trade and Industry
EC	—	European Community
EEF	—	Engineering Employers Federation
ERM	—	Exchange Rate Mechanism
FCO	—	Foreign and Commonwealth Office
HEFC	—	Higher Education Funding Council
HEFCE	—	Higher Education Funding Council for England
HEI	—	Higher Education Institution
IPMS	—	Institution of Professionals, Managers and Specialists
IPR	—	Intellectual Property Rights
MOD	—	Ministry of Defence
MRC	—	Medical Research Council
NERC	—	Natural Environment Research Council
OPSS	—	Office of Public Service and Science
OST	—	Office of Science and Technology
PCFC	—	Polytechnics and Colleges Funding Council
PES	—	Public Expenditure Survey
R&D	—	Research and Development
SERC	—	Science and Engineering Research Council
SMEs	—	Small and Medium sized Enterprises
S&T	—	Science and Technology
UFC	—	Universities Funding Council

MINUTES OF PROCEEDINGS RELATING TO THE REPORT

THURSDAY 10 DECEMBER 1992

Members present:

Sir Giles Shaw, in the Chair

Mr Spencer Batiste	Mr Andrew Miller
Dr Jeremy Bray	Mr William Powell
Mrs Ann Campbell	Sir Trevor Skeet
Cheryl Gillan	Mr Alan W Williams
Lynne Jones	

The Committee deliberated.

Draft Report, proposed by the Chairman, (The Policy and Organisation of the Office of Science and Technology), brought up and read.

Ordered, That the draft Report be read a second time paragraph by paragraph.

Paragraphs 1 to 68 read and agreed to.

Paragraph 69 read, as follows: “ We are especially concerned that the under representation of women in the advisory structure should be corrected. We agree with the CSA that it should be the overriding factor that all those on the Advisory Council should be there because they have a positive contribution to make. Nonetheless, we recommend that any new body should be more broadly based than heretofore.”

An Amendment proposed, in line 1, to leave out from the beginning to the word “We” in line 2.—(*Mr Spencer Batiste.*)

Question put, That the Amendment be made.

The Committee divided.

Ayes, 3	Noes, 5
Mr Spencer Batiste	Dr Jeremy Bray
Cheryl Gillan	Mrs Anne Campbell
Sir Trevor Skeet	Lynne Jones
	Mr Andrew Miller
	Mr Alan W Williams

Paragraph agreed to.

Paragraphs 70 to 117 agreed to.

Ordered, That a list of abbreviations be appended to the Report.—(*The Chairman.*)

Resolved, That the Report be the First Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Several papers were ordered to be appended to the minutes of evidence.

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.—(*The Chairman.*)

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OFFICE OF SCIENCE AND TECHNOLOGY

Rt Hon William Waldegrave, MP—Chancellor of the Duchy of Lancaster
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Mr Robert Foster—Under Secretary of State and

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DEPARTMENT OF TRADE AND INDUSTRY

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THE AGRICULTURAL AND FOOD RESEARCH COUNCIL

Professor Thomas Blundell, FRS—Director General

THE HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND

Professor Graeme Davies, F Eng—Chief Executive

THE NATURAL ENVIRONMENT RESEARCH COUNCIL

Professor John Knill, F Eng—Chairman

THE SCIENCE AND ENGINEERING RESEARCH COUNCIL

Dr Antony Hughes—Director, Programmes and Deputy Chairman

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CONFEDERATION OF BRITISH INDUSTRY

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Mr Ian Cooper—Chief Executive, BHR Group Ltd and

Dr John Taylor—Director, Hewlett-Packard Laboratories, Europe

ENGINEERING EMPLOYERS FEDERATION

Paul Lester—Chief Executive, Graseby Plc and
Professor David Balmford—Chief Scientist, Westland Helicopters Ltd
CHEMICAL INDUSTRIES ASSOCIATION

Dr John Brophy—General Manager Corporate Research, BP Chemicals Ltd,
Dr Michael Caton—Director Scientific Relations, Rhône-Poulenc Ltd and
Mr Doug Rodger—Executive Director, Business Development, CIA

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The following submitted memoranda and associated papers which have been reported to the House, but not printed; copies have been placed in the House of Commons Library, where they may be inspected by Members. Other copies are in the Record Office, House of Lords, and are available to the public for inspection. Requests for inspection should be addressed to the Record Office, House of Lords, London SW1 (tel. 071-219 3074). Hours of inspection are from 9.30 am to 5.00 pm on Mondays to Fridays.

1. James Bentley, CEng, FIMechE, Managing Partner of KPMG Management Consulting.
2. Centre for the Exploitation of Science and Technology.
3. Advisory Council on Science and Technology.
4. Advisory Board for the Research Councils.
5. Confederation of British Industry.
6. Association of Medical Research Charities.
7. Higher Education Funding Council for England.
8. UK Industrial Space Committee.
9. British Association of Remote Sensing Companies.
10. Economic and Social Research Council.
11. Science and Engineering Research Council.
12. Committee of Vice-Chancellors and Principals of the Universities of the UK.
13. Welsh Funding Councils.
14. Council of Science and Technology Institutes.

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